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Subject: State Water Resources Control Board Hearing on the IID-SDCWA long-term transfer and the IID-SDCWA transfer EIS-EIR.

Thank you for the opportunity to comment upon the IID-SDCWA transfer EIS/EIR. I am grateful to be asked to testify for these proceedings.

The below analysis stems dissertation research conducted in water resources geography at the Department of Geography, University of Colorado, Boulder between 1995-2000. The first stage of the analysis draws upon theoretical frameworks developed by water resources geographers and water historians. Water resources geographers have a long-standing tradition of combining different research techniques to explore interactions between water and society, and society's capacity to guide those interactions along more equitable and sustainable trajectories (Kates et al. 2001, 641; Wescoat 1992; White 1974). As this analysis demonstrates, water resources geographic research spans a wide range of spatial scales from the phenomena of international water policy to household water use (Wescoat in press). Geographical analyses of transbasin water diversions are examples of research that extends across multiple scales, while raising equity and sustainability concerns. Platt's (1995) analysis details the political movement opposing transbasin diversions to metropolitan Boston, and the institutional response of demand management. Gilbert White's (1957) commentary on large-scale water storage and diversions projects is probably the first to posit the connection between water diversions and regional economic/urban growth. Finally, Wescoat's (1993) analysis of aggressive water acquisition tactics utilized by Western U.S. water-short cities such as Las Vegas, highlights equity concerns associated with these tactics.

Despite these studies, the topic of urban water in geographic research remains underdeveloped (Wescoat in press). The lack of attention to urban water could be one reason why water resources geographers pay surprisingly little attention to the subject broadly referred to in water policy circles as "California water". The urban geography and history of California water has been extensively documented by historians (Worster 1985; Hundley 1992), environmental journalists (Reisner 1993; Gottlieb 1988), and has garnered attention in films such as *Chinatown* (1974) and *Cadillac Desert* (1997). During the past decade, a handful of geographers examined California's urban water including such topics as urban politics and water (Pincetl 1999); urban water demand management (Dziegielewski and Baumann 1992; Dziegielewski et al. 1993); and Los Angeles' storm water policy (Dallman and Piechota 2000). California's water and urban planning policy demonstrate tremendous geographic research potential – especially given the growing research interest in sustainable cities (Sustainable Cities Program, University of Southern California, www.usc.edu/dept/geography/ESPE), new urbanism (Till 2001) and environmental justice (Pulido, Sidawi and Vos 1996).

As with California, geographical research is sparse on the topic of urban water in the U.S.-Mexico border region, or more specifically for this analysis the Calfornia-Baja California region. Lloyd and Marston (1985; 1982) combined human and physical geographical research techniques to analyze an omnipresent problem for Ciudad Juárez, Mexico and most cities throughout Latin America and the U.S.-Mexico border -- a shortage of clean water supplies coupled with rapid urban industrialization and growth. Brown's (1998) political ecology analysis of wastewater in Tijuana, Baja California explores yet another urban water topic undeveloped by geographers – water quality. One reason for the lack of geographic inquiry in urban water quality could be that scientific research and government regulation of water quality (as compared to water supply) are relatively new and rapidly changing disciplines. The analysis fills a significant theoretical and pragmatic research gap in water resources and urban geography by comprehensively examining the geographical relationships (spatial and nature-society) of water quality for all three urban water resources: wastewater, storm water and drinking water.

Besides the above theoretical frameworks the analysis findings are based upon dissertation research fieldwork undertaken in Tijuana and San Diego between 1997-2000. To carry out the study, I employed three commonly used field research and policy analysis techniques: participant observation, document analysis and field interviews. Participant observation entailed observations of meetings, public forums and work groups concerning water, storm water and wastewater management for these two cities. My document analysis consisted of reviewing four categories of water organization communications: public forums, persuasive communications[1], water resources reports, plans and studies. Finally, I conducted fifty-two focused, open-ended formal interviews with scientists, engineers, government officials and environmental representatives in the California and Baja California. The research was conducted under the guidance of Dr. James Wescoat Jr., Specialty: Water Resources Geography and Policy; Dr. Anthony Bebbington, Specialty: Political Ecology; Dr. William Riebsame, Specialty: Environmental Planning; Dr. Susan Beatty, Specialty: Biogeography; and Dr. Steven Mumme, Specialty: U.S.-Mexico Environmental Policy. The academic result of this research was a Ph.D. (Spring 2000) in water resources policy and geography from the Department of Geography,

[1] Examples of persuasive communications are maps, geographic information systems utilized to persuade other stakeholders or the public, lawsuits, organizational comments made at stakeholder proceedings, and organizational press releases.

University of Colorado, Boulder. In addition, results of this research have been published in three refereed publications. The dissertation was selected as a finalist for 2002 Nystrom Paper Competition for Best Dissertation in Geography, sponsored by the Association of American Geographers (10 finalists selected nationwide). A journal article written from this analysis will be submitted to the *Annals of the Association of American Geographers.*

If the comments that follow seem incomplete, I readily acknowledge that they are. As I have stated in both public arenas and in academic conferences, my evaluation of the water transfer is a work in progress. I anticipate that the coming weeks will bring much more detailed commentary on the impacts of the water transfer. This more detailed analysis will evolve, but not move beyond of the scope of the below submitted written comments.

Role of the SWRCB

SWRCB hearings concerning these transfers must be comprehensive, analyzing and reviewing water rights, water supply and water quality impacts associated with the SDCWA-IID transfers. I remind board members, that the SWRCB was created to administer California's system of water rights and manage water pollution planning and regulation.[2] SWRCB's institutional integration of water rights and quality management occurred because the when the now defunct State Water Rights Board approved an application to appropriate water, the Board did not take into consideration the downstream water quality effects of the appropriation (Littleworth and Garner 1995). California state assembly hearings investigating the formulation of the SWRCB cited the Bay-Delta estuary as a prime example of this deficiency. The previous State Water Rights Board had recognized the "need to protect water quality as a part of the rights of existing Delta users" (Littleworth and Garner 1995, 113). However, the Water Rights Board only administered water supply rights and disputes. It was unable, in a legal and governance sense, to prevent water quality degradation resulting from diversions (Littleworth and Garner 1995). In 1969 California's Porter-Cologne Water Quality Control Act enabled the newly formed SWRCB to "incorporate water quality considerations into the procedures governing the acquisition of water rights" (Littleworth and Garner 1995, 114). Hence, even before the U.S. Congress enacted the Clean Water Act in 1972, California had created an administrative entity to govern water supply and water quality.

From the late 1960s to the early 1990s, SWRCB has continued its role of integrating water supply and water quality issues during the the SWRCB hearings involving water rights of the State Water Project (SWP) and Central Valley Project (CVP). The purpose of these hearings was to coordinate the operation of these projects with protection of water quality, fish, and wildlife within

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2 In California, the 1969 California Porter-Cologne Water Quality Act and the 1972 U.S. Clean Water Act provided the regulation mechanisms for water pollution management and reduction.

the Bay-Delta Estuary (Littleworth and Garner 1995). The underlying theme of these hearings was that water quality in the Delta should be at "least equal to the levels that would have been available if state and federal projects had not been constructed" (Littleworth and Garner 1995). During these hearings (and subsequent lawsuits challenging State Board policy for the Bay-Delta estuary), the State Board grappled with complex political and legal questions associated with management of water transfers from the Bay-Delta region. For example, in managing Bay-Delta estuary water quality, is the State Board's primary task protecting water rights, or is it protecting the designated beneficial uses (i.e., fisheries, recreation, etc.) of Bay-Delta estuary waters? Should the State Board consider all competing demands for water, not just state and federal demands on water? What is the role of the Clean Water Act in determining the proper balance between water quality and water diversion interests? Finally, is the State Board's balancing authority (of water quality and diversion interests) limited to water use within the Bay-Delta estuary (Littleworth and Garner 1995)? Can, for example, the State Board mandate water conservation regimes in regions (such as Southern California) importing or receiving Bay-Delta estuary water? It is this level of detail and comprehensive analysis (water supply and water quality), that I request the SWRCB to conduct for the San Diego-IID water transfer.

Hydrocommons: Establishing the Connection between
the Colorado River Delta and the San Diego-Tijuana metropolitan region

Historically to enable urban growth and economic development, politicians and water agencies have promoted water transfers -- sometimes hundreds of miles – between perceived areas of "lesser need" to perceived areas of "greater need," as in the case of water transfers from Owens Valley to Los Angeles. This practice results in the creation of the hydrocommons, a geographical linkage that connects regions through the long distance water transportation. I provide evidence from a case study of Colorado River water diversions to the San Diego-Tijuana metropolitan region. By examining the urban geography of water transfers and urban growth, I argue that water quality and biological diversity problems exist in both sending and receiving regions of the hydrocommons. The first section of this analysis demonstrates how water resources geography provides a foundation for the hydrocommons approach. In the following sections, I examine the geographical relationships between imported water, urban growth and water quality for two regions connected by a hydrocommons: the Colorado River Delta and the Tijuana-San Diego metropolitan region.

The SWRCB may question why I emphasize the San Diego-Tijuana metropolitan region, since the proposed transfers are purportedly for San Diego. However, in the EIR/EIS creates an incomplete picture of water transporation, infrastructure and growth induced by these transfers. One essential missing significant piece of infrastructure that may transport this water – the proposed binational aqueduct currently being investigated by the SDCWA and the International and Boundary Commission. I request that the State board require that that the EIR address proposals concerning the binational aqueduct, since if built, will carry IID water to San Diego. In addition, even though the EIR/EIS state that the transfers are not growth inducing for the City of San Diego, there is substantial evidence from documents produced by numerous agencies (water agencies, land use planning agencies, SANDAG) that these transfers will support further growth in San Diego and Tijuana. Hence the EIR analysis is misleading. Cumulative growth-inducing impacts to the entire Tijuana-San Diego hence must addressed in the EIR/EIS analysis.

Before discussing the links between environmental degradation, urban growth and water transfers, it is important to understand water transfers. In the United States, water transfers are understood as the process of moving water supplies through water storage and distribution systems from areas of lesser need to areas of greater need (Water Education Foundation 1996). Water transfers may occur either within a watershed, or beyond natural watershed boundaries. Research interviews reveal that water supply agencies and politicians in Tijuana and San Diego cite transbasin water transfers as advantageous because the transfers meet the water demands of a growing urban binational economy and population.

According to Weatherford (1990), once a transbasin water diversion or transfer is made the sending and receiving basins/watersheds are linked. When conveyance systems such as storage reservoirs and aqueducts establish water transfers, the receiving basin becomes dependent upon the sending basin for water. In addition, the sending basin is no longer self-contained because water is diverted beyond its natural basin boundaries (Weatherford 2000). The linkage (made via the transfer) reshapes the natural boundaries of both sending and receiving basins. The reshaped boundaries establish hybrid basins or regions, which are tied together by man-made plumbing. The hybrid regions are known as hydrocommons (Weatherford 1990; 2000).

The geography of water resources along the border between California and Baja California entails a hydrocommons, or a connected network of aqueducts and storage facilities utilized for water transfers. This hydrocommons transports Colorado River water for agricultural uses in eastern Southern and Baja California (Imperial Valley and Mexicali), and ultimately west to urban centers such as Tijuana, Los Angeles and San Diego. San Diego imports between seventy-five to ninety percent of its water, approximately 430,000 acre-feet, annually. This water is transported from the Sacramento River Basin, 600 miles north, or the north-south hydrodommons, and from the Colorado River, approximately 240 miles to the east, or the east-west hydrocommons (Laru pers. com. 2000). In wet years, Tijuana depends primarily on local water resources. However, each year Tijuana can import up to ninety-five percent of its water supply, or 63,834 acre-feet of Colorado River water (Comisión Nacional del Agua 1999). At present, both cities are investigating expanding the east-west hydrocommons via the construction of a binational Colorado River aqueduct, for reasons I outline below.

San Diego actively supports an increase in water supplies because local government officials cite that San Diego's population will increase from 2.8 million in 1999 to 3.6 million in 2015 (San Diego County Water Authority 1999). In addition, water supplies need to be long term and reliable to support San Diego's 87 billion dollar economy (San Diego County Water Authority 1999). By 2015, San Diego County Water Authority officials estimate that San Diego's growing economy and population will nearly double the region's demand for water supplies to 868,700 acre-feet per year (San Diego County Water Authority 1999).[3] One key provision of San Diego's plan to increase its water supply, is for Imperial Irrigation District (IID)[4] to transfer or sell Colorado River water directly to the San Diego County Water Authority. The San Diego County Water Authority Board of Directors approved this agreement in 1998 (San Diego County Water Authority 1999). The agreement proposes to transfer 200,000 acre-feet per year for an initial term of 45 years. San Diego County Water Authority may increase the water transfer amounts to a total of 300,000 acre-feet, and renew the water transfer agreement for an additional 30 years (San Diego County Water Authority 1999). Hence, the underlying assumption in the EIR, that the project purportedly will not increase the amount of water delivered to the region, is simply not correct. The transfer provides rights to an additional 200,000 acre-feet (and potentially 300,000 acre-feet) that San Diego County would not otherwise have access to.

The San Diego County Water Authority-Imperial Irrigation District water transfer represents San Diego's move to obtaining its own water imports besides those it now receives from Metropolitan

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3 This doubling of demand is in part due to a common paradigm in western water resources policy known as "build to demand." In this type of water resources planning, the water resources agency estimates future growth in a region, and then estimates the increased demand to support this growth. The next step is to build water supply infrastructure to meet that perceived demand. Historically, numerous water resources agencies such as California's Department of Water Resources and the San Diego County Water Authority have not encouraged discussion of water resources limits (i.e. that there is a limited supply of water resources available to a region). One of the reasons why there seems to be no limit is due to the availability of interbasin transfers to augment urban water supplies. Consequently, since the assumption that there is no limit, then managing demand has not been a crucial element of water resources planning. Managing demand or demand management, focuses upon the demand side of the equation, and examines how demand can be minimized via more efficient use of water, water conservation techniques and water reclamation. For more discussion of the build to demand paradigm in the Tijuana-San Diego metropolitan region see Michel (200a), Chapter 6.

[4] Imperial Irrigation District provides water for agriculture and cities in Imperial Valley, California. All the water IID receives, approximately 2.77 million acre-feet per year, is diverted from the Colorado River which is managed and operated by the United States Bureau of Reclamation (Imperial Irrigation District 1996a; 1996b).

Water District of Southern California (MWD).[5] At present, all of San Diego's imported water is supplied by MWD. By 2015, San Diego County Water Authority proposes to reduce MWD imports by twenty-five percent (San Diego County Water Authority 1999). However, even with its own water supplies from IID, San Diego is still dependent upon MWD to transport the water from the Colorado River. At present, the only way for San Diego County Water Authority to transport IID water is through the Colorado River aqueduct, an aqueduct owned and operated by MWD.

Negotiations for the wheeling rate, (transport fees) of IID water with MWD have been problematic at best. San Diego wants to keep costs down on the transportation fees and claims that MWD's wheeling rate is yet another example of MWD over-charging their customers (Michel 2000). On the other hand, MWD which has built, financed, and maintains the aqueduct and water treatment facilities, asserts that San Diego should pay for these services in the wheeling or transportation rates. As a result of these tense negotiations concerning use of MWD's aqueduct, San Diego looks south to work with Tijuana, and build a second aqueduct which would transport IID water transfers and Tijuana's increasing Colorado River water allocations to the San Diego-Tijuana metropolitan region.

Tijuana's current allocation of Colorado River water is 2,537 liters per second (Comisión Nacional del Agua (CNA) 1999). This water is delivered by the Río Colorado-Tijuana Aqueduct, an aqueduct operated and maintained by the State Water Service Commission or the Comisión de Servicios de Agua del Estado (COSAE). The water organization which delivers water to Tijuana's water users (imported and locally developed water supplies), is a state agency, the Comisión Estatal de Servicios Públicos de Tijuana (CESPT). This agency provides both water and wastewater services to Tijuana and Rosarito Beach (a community approximately sixteen miles south of Tijuana).[6] Like San Diego, Tijuana seeks to increase its water supplies to support a growing economy and population. By 1999, Tijuana's population grew to 1.2 million people, and by 2010 Baja California's State Water Agency estimated the population to be well over two

[5] Critics cite that San Diego's need for independence from MWD is resulting in water transfer deals, which force San Diego county water users to pay more for water. The IID water transfers indeed support this assertion. IID pays the U.S. Bureau of Reclamation $12.50 per acre-foot of Colorado River water. If the IID-San Diego County Water Authority transfers are approved, IID will sell water to San Diego County Water Authority for $200 per acre-foot of water, and increasing to around $306 per acre-foot of water. Based upon other agriculture to urban water transfers in California (Central Valley Project water for example), critics state that San Diego should pay between $165 to $185 per acre-foot of water. One critic estimates that for the initial forty-five year, 200,000 acre-foot contract, San Diego ratepayers will spend $1.1 billion dollars more than they should be paying for water (Erie 1997).

[6] However, the state agency in charge of the aqueduct, Comisión de Servicios de Agua del Estado (COSAE) does not operate the aqueduct until Tijuana runs out of local surface and groundwater supplies, usually in years with drought conditions. This action saves the state from paying expensive energy costs associated with pumping water over the mountains between Tijuana and the Colorado River. In addition,

million (Comisión Estatal del Agua (CEA) 1999). Tijuana's rapid population growth rate poses for CESPT a tremendous challenge to provide potable water for all city residents. This is an especially difficult task since state and municipal local agencies receive little or no financial income from the federal government (Carter 1999). It is estimated that by 2004 water rationing will start for Tijuana (San Diego Dialogue 1999). According to a local newspaper, Tijuana has four options to solve its water shortage problem. First, Tijuana may retrofit and modernize the existing aqueduct (González Delgado 1999). Second, the city may construct a second aqueduct. Third, it may construct desalinization plants, and fourth the city may use wastewater reclamation as a supplemental source of water. (González Delgado 1999).

The government-sponsored proposal to build a binational aqueduct for the Tijuana-San Diego metropolitan region has its roots in the Border Water Council. The Border Water Council was formed in 1998 and was designed as a forum for water agencies in Tijuana and San Diego to discuss binational solutions to water resources management in the Tijuana-San Diego metropolitan region. At present, the primary impetus of the Border Water Council is to investigate the possibility of a constructing a binational aqueduct to deliver water from the Colorado River to the Tijuana-San Diego metropolitan region. There is a second, private proposal by two Mexican businessmen for a Tijuana-San Diego binational aqueduct. Francisco Molina, director of the Mexican development company EMTEC, and Gastón Luken Aguilar, chairman of the board of Proxima Gas propose building a binational aqueduct and power plant in Mexico (San Diego Dialogue 1999). This aqueduct would have a capacity of 525,230 acre-feet per year, with up to 300,000 acre-feet of IID water for San Diego, and 225,230 acre-feet of water for Tijuana (San Diego Dialogue 1999). The total cost of the aqueduct-power plant project is estimated at 800 million dollars (González Delgado 1999). However, binational discussions concerning the aqueduct do not consider the environmental consequences of present, yet alone proposed transbasin diversions from the Colorado River. A geographical analysis entails examining economic, political and environmental links for both ecosystems that send and cities that receive water. In the next section, I focus upon the sending ecosystem for the east-west or Colorado River hydrocommons supporting the Tijuana-San Diego metropolitan region -- the Colorado River Delta.

Colorado River Hydrocommons Connections and Environmental Impacts – The Sending or Problem Region: The Colorado River Delta and Upper Gulf of California[7]

the current aqueduct is in poor structural condition, and there is significant water loss from the aqueduct as it delivers water from the Colorado River to Tijuana.

[7] The author understands that the geographic scope of the sending region is the entire Colorado River Basin and its tributaries. In this article I focus upon regions impacted by transbasin diversions, known as the problem regions. Problem regions in hydrocommons are usually the mouth or end of the river, or as in the

According to Anderson (1999), four linked wetland regions in Baja California and California need immediate restoration attention. These wetland regions which are linked through migratory bird routes along the Pacific Coast, are the Klamath Basin, the San Francisco Bay-Delta estuary, the San Joaquin Valley, and the Río Colorado (Colorado River) Delta region. The latter delta, also known as California's "Other" Delta (the other delta besides the San Francisco Bay-Delta estuary) is a wetland ecosystem that to date has largely been ignored by policy makers in the California and to a certain extent in Baja California. Like the Bay-Delta estuary, the Río Colorado Delta has been dramatically altered by transbasin diversions from the Colorado River (Morrison, Postel and Gleick 1996).

At the turn of the century, the Colorado River Delta, or the Río Colorado Delta, was the largest and most diverse desert wetland system in North America (Anderson 1999; Morrison, Postel and Gleick 1996). This delta spanned an enormous area, more than 150 miles long and 100 miles across (Bates et al. 1993). Aldo Leopold described the region as one of hundreds of green lagoons, awesome jungles, and lovely groves (Leopold 1966). The Delta supported between 200-400 plant species in various habitats from forests, to grasslands, to tidal wetland marshes and estuaries (Morrison, Postel and Gleick 1996). Geese, doves, pelicans, egrets, sea turtles, bobcats, jaguars, tropical birds and deer thrived in the Delta (Bates et al. 1993). In addition, nutrients, sediment loads and fresh water from the Colorado River supported not only the Delta wetland habitat, but also the diverse and productive Upper Gulf of California marine ecosystem. Mexico's Upper Gulf of California or the Sea of Cortez was once a place of special biological richness and a seemingly limitless source of fish for food, commerce and sport (Vincent 1999, 1).

In 1999, Colorado River transbasin diversions in the U.S. and Mexico have reduced dramatically the natural flow of water, silt and nutrients to the Colorado River Delta and the Upper Gulf of California. Except for rare high flood years (for example in 1983 and 1998), the entire flow of the river is diverted and used (Glenn et al. 1996; Morrison, Postel and Gleick 1996, 22). The reduced Colorado River flows have desiccated the Delta and the Upper Gulf estuaries. In addition, freshwater wetlands and riparian habitat supported by the natural flow of the Colorado River have diminished considerably (Glenn et al. 1996).[8] Today wetland habitat exists but only where agriculture drainage water is discharged or where there is groundwater flow.

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case of the Colorado River, the Delta where little to no water flows from upstream sources. The entire Colorado River hydrocommons is quite large and complex, including water resources management of upper basin states and municipalities such as Denver, Colorado.

[8] Some of the wetland loss can be attributed to conversion of wetlands to agricultural use (Water Education Foundation 1999).

Due to the amount of wetland habitat that has been lost, a number of species that depend upon the Colorado River Delta and the Upper Gulf ecosystem are now threatened or endangered. One group of threatened species are migratory birds which depend on the Delta wetlands and Sea of Cortez as a major breeding habitat region. The Delta and the Sea of Cortez is considered by avian biologists as an important link in the Pacific Flyway system (Anderson 1998; 1999). The Pacific Flyway system, includes numerous wetland regions such as the Colorado River Delta, the Salton Sea and Northern California's Bay-Delta estuary. These wetlands host migrating waterfowl as they travel along the west coast of North and South America. It is estimated that the Colorado River riparian vegetation in Mexico has the potential to support 120,000 resident and migratory waterfowl (Luecke et al. 1999).

Not only wetland ecosystems, but also marine ecosystems have been impacted by the diminished Colorado River flows into the Upper Gulf of California. Local fisherman and local biologists in the Gulf of California assert that the sharp decline in Gulf shrimp and commercial fish fisheries is due in part to the lack of nutrient-rich water inflow from the Colorado River into the Gulf of California.[9] In addition, Colorado River transbasin diversions has resulted in a severe reduction in numbers of two significant marine species. The first is the vaquita (or little cow), the world's most endangered porpoise. The vaquita's range is the Delta and Upper Gulf of California. This porpoise grows to about four feet in length and feeds on small fish and squid. Very little is known about the vaquita since it is believed that only a few hundred remain. Certain scientists assert that the sharp decline in Northern Gulf of California fish populations (the vaquita's food source) is to blame for the near extinction of the vaquita. This sharp decline is caused by over-fishing in the Gulf, and insufficient Colorado River fresh water flows entering the Gulf (Vincent 1999a).[10]

The second indicator species is the totoaba, a large silver-blue fish found only in the Gulf of California. As in case of young salmon that use Northern California's Bay-Delta estuary as a nursery, biologists have found that the shallow waters and dense sea grass vegetation of the Río Colorado Delta-estuary provide breeding and nursery habitat for the totoaba. Totoaba spend approximately the first year of their life in the Río Colorado Delta-estuary feeding on crustaceans and small fish. After the first year, the totoaba spends most of its adult life in the deep waters of the Gulf of California. The totoaba can grow up to 2 meters in length and weigh 140 kilograms

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[9] According to Glenn (1998) increased fresh water Colorado River flows has resulted in increase in shrimp catch as far south as the coast of Guyamas.

[10] One Mexican biologist has witnessed the vaquita feeding in the Delta during low tide. This biologist now asserts that the vaquita depends upon young fish and shrimp, which breed and grow in the Delta estuaries (*San Diego Union Tribune,* June 17, 1998). If this observation is true, then the vaquita's survival is dependent upon increased Colorado River flows to the Delta.

(Morrison, Postel and Gleick 1996, 23). Each year, mature totoaba return to the Delta to breed and lay eggs. Today the fish is on the verge of extinction.

At the Universidad Aútonoma de Baja California in Ensenada (UABC, Ensenada),[11] fisheries biologists have constructed possibly the last breeding and nursery habitat available for the totoaba. In the early 1990s, the Mexican government recognized that the totoaba was heading for extinction. Subsequently, UABC fisheries biologists were sent out to the Gulf to capture and breed seven adult totoaba. These totoaba now live in two large seawater tanks at UABC, Ensenada. Twice a year the biologists raise the temperature of the tank water. This rise in temperature sparks breeding behavior, resulting in thousands of totoaba eggs. The eggs are hatched, and young totoaba spend between four months to a year growing in nursery tanks at UABC, Ensenada. During the first year of the totoaba fishery project, three totoaba survived the hatching and rearing process. In 1999, I witnessed hundreds of young totoaba in the nursery tanks. UABC biologists have relayed to me that the survival rate now is much higher because they are learning from past mistakes and presently provide better nursery conditions for young totoaba. When the biologists receive approval from the Mexican government, the totoaba are trucked from Ensenada across the Baja Peninsula and released into the Upper Gulf of California.[12]

In addition, Mexican national government officials now recognize that the Colorado River Delta is key to the environmental health of the Lower Colorado River Basin and the fisheries in the Gulf of California. In 1993, the Mexican government set aside 2.3 million acres of water and land within the Delta and the Upper Gulf as an United Nations Biosphere Reserve (Vincent 1999a; Water Education Foundation 1999). The Biosphere encompasses over 400,000 acres within its core zone, limiting activities to research, small-scale shell harvesting and limited ecotourism (Water Education Foundation 1999). For the manager of the Biosphere Reserve and conservation biologists in the U.S. and Mexico, the major goal of the reserve is to obtain fresh water flows from the Colorado River.[13]

What is rarely recognized in the negotiations for Colorado River water, is the environmental consequences of transbasin diversions to the Delta and Upper Gulf of California. Along the border of the Californias, the cities of Tecate, San Diego, Tijuana, Rosarito Beach and Ensenada

[11] Ensenada is located on the west coast of the Baja California peninsula 60 miles south of Tijuana.
[12] This information on the totoaba was provided to me during a tour of the totoaba fisheries facility at UABC, Ensenada, October 22, 1999.
[13] How much flow is the question. Because the Delta is located within an arid desert region with intermittent precipitation and hence river flow patterns, a report sponsored by the Environmental Defense Fund suggests a perennial flow of 32,000 acre-feet, with a flood flow (once every four years) of 250,000 acre-feet (Luecke et al. 1999).

are counting on increased Colorado River diversions as the next source of water to support each city's anticipated growth.[14] However, as argued by Morrison, Postel and Gleick (1996), since Mexico receives less than ten percent of Colorado River flows, it is unrealistic and inequitable for Mexico to assume all the responsibility of restoring ecosystems in the Río Colorado Delta and the Upper Gulf of California. As indicated by the above discussion on the totoaba fishery and the Delta Biosphere Reserve, Mexico has taken localized steps to slow down the degradation process.

Colorado River Delta restoration can only be accomplished with international cooperation and agreement. As is being done in the CALFED process for Northern California's Bay-Delta estuary, all Colorado River water users need to take responsibility for downstream environmental consequences in the Río Colorado Delta ecosystem. However independent of any binational effort to restore the Delta, U.S. law requires preventing further harm to endangered species that inhabit the Delta habitat. This is especially true for migratory waterfowl that spend part of the year in the United States. Five species that inhabit the Lower Colorado River Basin, American pergrine falcon, the razorback sucker, Southwestern willow flycatcher, Brown pelican and Yuma Clapper Rail are listed by Fish and Wildlife Service with reference to critical habitat in Mexico. Legally it is unresolved whether the ESA restricts agency actions when impacts are created across the internationally boundary (Pitt et al. 2000, 850). The National Environmentl Policy Act (NEPA) requires federal agencies to consider the environmental impacts of their actions, and Executive Order 12114 directs federal agencies to consider the environmental effects abroad of major federal actions (Pitt et al. 2000, 850, such as this water transfer. I request that the EIR/EIS process include in its analysis impacts to the above listed endangered species, critical habitat designation including the Delta, and impacts to Delta critical habitat.

Colorado River Hydrocommons Linkages and Environmental Impacts: The Tijuana-San Diego Metropolitan Region or the Receiving Region

Wastewater Issues

> A San Diego-Baja aqueduct study is a good idea. But dare we hope that the worthies studying the idea will plan what to do with the water after it has been flushed into Baja's sewers? And ours too, for that matter. This year for the first time in decades, I have not needed medical attention for infected sinuses and ears. Because this year, for the first time in decades, I have not gone into our ocean. Cleaning up the water we already have

[14] In comparison with water use of IID (3 million MAF), the amount of imported water these cities hope to receive is small (300,000 – 400,000 AF). However, the reader must note that the agriculture to urban transfers is not new water per say, but diverted agriculture water transferred to urban regions. In addition, this small amount could restore the Delta. I am not stating that Tijuana and San Diego should assume the complete responsibility for restoring the Delta, yet at some point, all users of the Colorado River hydrocommons must recognize the binational water quality and wetlands problems emerging along the border of the Californias.

should be of first importance. (Editorial, *San Diego Union Tribune,* September 17, 1999)

This editorial elucidates a concern often not thought of concerning hydrocommons construction and management. What are the land use and water quality impacts of the diversion to the region that receives the transbasin diversions? This analysis has been overlooked completely in the EIR/EIS analysis. A geographical approach to hydrocommons management examines the complex political, economic and environmental flows or interactions for all regions. Given this geographical approach, if there are environmental consequences in the receiving region exacerbated by transbasin diversions, should not these impacts in the receiving region be a consideration in the EIR/EIS analysis? In addition, since the proposed water transfers may be transported in a binational aqueduct to San Diego and Tijuana, I incorporate my analysis of the binational metropolitan region. Water quality impacts due to the transfers and the binational aqueduct may result in increased water pollution in Tijuana. As the SWRCB is aware water pollution from Tijuana does not stop at the U.S.-Mexico border, but impacts beaches throughout San Diego County.

The most obvious link between an increase in water imports and water quality is that water supply increase may result in an increase of wastewater flows (Gunnerson 1991; Osann and Young 1998). In Mexico, because state and federal level hydraulic plans evaluate both water supply use and wastewater discharges, the correlation between developed water supply and wastewater discharge data is easy to plot. Guzman (1998) reviewed the water supply and wastewater discharge data for Tijuana. His analysis revealed that between 1984 and 1999 Tijuana's developed water supply nearly doubled. This increase of water supply has contributed to a threefold increase in wastewater discharges and threefold increase in uncontained wastewater flows (Guzman 1998).

In San Diego, there is much discussion as to the cumulative amount of water imported to Southern California, yet there is little discussion concerning the cumulative loads of wastewater deposited into Southern California's coastal region. One 1998 study analyzed the four largest municipal wastewater treatment facilities discharging into Southern California's coastal waters. A noticeable trend is the ninety percent wastewater flow increase for San Diego's Point Loma Wastewater Treatment Plant. The study cites that population growth patterns, regional industry types and numbers, presence or absence of water reclamation programs, and inland discharge sources account for differences among the plants (Raco-Rands 1998, 4). An increase in developed water supply was not cited as a possible cause of increased wastewater discharges.

Table 1 provides an initial analysis linking water imports, City of San Diego water supplies, City of San Diego urban population numbers and wastewater flows. As the reader will note there is a positive correlation between water imports and Point Loma's wastewater flows. However, the reader must also note that the service areas, land use types and populations served for each agency listed in Table 1 are not the same.[15]

Table 1
Links Between Water Supply, Urban Growth and Wastewater Discharges

Year	SDCWA Imports (AF)	City of SD Total Water Supply Deliveries (AF)	City of SD Population	MWWD Wastewater Discharges (mgd)
1974*	337,757	153,671.7	1,358,000	102
1980	309,826	175,667.4	1,862,004	132
1990**	674,016.1	236,491.0	2,498,000	185
1998	433,490.1	210,936.9	2,690,255	194

Sources: Ganster 1998; Laru pers. com. 2000; City of San Diego Metropolitan Wastewater Department National Pollution Discharge Elimination System (NPDES) Permit Annual Reports, San Diego Regional Water Quality Control Board, Michel 2000.
* 1974 is the first year MWWD filed an NPDES permit for wastewater discharges from the Point Loma Wastewater Treatment Plant
**1990 reflects a drought year, hence a large increase of water imports

Although wastewater flow volumes have increased in Southern California, the amount of certain pollutants discharged have decreased. In 1971, these four plants released nearly 600 metric tons of copper and chromium (Raco-Rands 1998). By 1996 the plants discharged approximately 6.5 metric tons of chromium and 49 metric tons of copper. Between 1971 and 1996, oil and grease discharges decreased by 76 percent (Raco-Rands 1998). The study cites that increased source control, land disposal of biosolids, sludge dewatering, and technological advances in primary and secondary treatment methods account for the reduction in contaminant mass emissions (Raco-Rands 1998). Again there is no discussion of whether water conservation methods have contributed to a decrease of pollutants discharged (Osann and Young 1998).

An increase of wastewater flows entails a need for more and larger pipelines to collect and convey the wastewater to a municipal wastewater treatment plant. Research data reveals that citizen activists in both cities charge that the planning process does not address the need to increase daily sewage capacity and the need for more maintenance on sewer lines (More

[15] In fact numbers from San Diego County Water Authority can be misleading because water imports for San Diego County not only support urban uses but agricultural uses. Hence, I have included City of San Diego usage. Remember MWWD discharges reflect not only discharges from City of San Diego, but also fifteen other municipalities or wastewater districts outside San Diego's city limits.

pipelines entail more inspections, cleaning and replacement of pipes.) (*The Beacon,* Thursday July 22, 1999). According to San Diego City Councilmember Donna Frye:

> You can only fit so much stuff into a pipe. San Diego is building projects and adding users. Where you had a single family home, you now have a condo building; where you had a mom and pop store, you now have a mini-mall. Poor planning is the culprit, and we are dealing with the problem after the fact. When looking at a pipe which is fifty years old, over capacity and in poor structural condition, the answer to the question: “Should we have repaired our pipes earlier?” is self evident. (*The Beacon* Thursday July 22, 1999)

Growth Induction.

The above discussion on wastewater infrastructure and urban growth/sprawl leads us to a controversial yet necessary topic, which must be address before I discuss the cumulative impacts of nonpoint source pollution. In essence, what is the relationship between imported water and urban growth? The EIR/EIS analysis fails to recognize and quantify the growth inducing impacts of their respective projects in the water-receiving communities. This flawed analysis is due in part to poor research methodology that does not recognize the immense literature on the topic, conducted by geographers and environmental historians. According to Reisner (1993), Gottlieb (1988), Worster (1985) from a historical perspective cities, like Los Angeles and San Diego, could not grow without a growing supply of imported water. For example, Tijuana’s rapid population growth rate (5.8 percent each year) has also been accompanied by a two-fold increase of developed water supplies between 1984 and 1999 (Guzman 1998). On the other hand, Southern California Metropolitan Water District’s cites that aggressive conservation measures resulted in the Southern California’s population increasing by 2.8 million between 1987-97, without an increase of water supplies (Hubbell pers. com. 1999). In San Diego water agency representatives state that they simply supply water. Furthermore, since the agencies do not conduct land use planning, they do not encourage urban growth or sprawl in San Diego County. Not surprisingly, indeed, the SDCWA urban management plan shows that the IID transfer is *vital* to maintain the San Diego "expectation" of serving a population that will expand from a present level of 2.8 million to 3.8 million.

Given these conflicting points of view on the links between urban water and growth, the more appropriate question to ask is does an increase of water imports encourage an expansion of urbanized land use? In both cities, urban centers are not only growing in population numbers, but also in square miles of urbanized region. The amount of urban expansion, does differ. According to Ojeda’s (2000) biogeographical analysis, in 1938 the city covered 17.35 square miles. By 1994, the city had extended to 121.45 square miles for 1,035,415 residents (Ojeda 2000; Ganster 1998). San Diego’s urbanized region can best be estimated by the total square miles of urban infrastructure. San Diego’s Metropolitan Wastewater District’s sewerage service area which encompasses the City of San Diego and fifteen cities and districts, is 450 square miles (City of San Diego, Metropolitan Wastewater Department (MWWD) n.d.; Michel 2000).[16] Within this service area, MWWD serves approximately 2,000,000 residents. Given these numbers, Tijuana's urban population density is approximately 8,500 persons per square mile. San Diego's is 4,444 per square mile. Hence, San Diego's urban consumption of land is two times greater than that of Tijuana. In fact the trend towards low density urban sprawl will continue in San Diego. According to the 1999 San Diego Association of Governments Cities/County Forecast, between 1995 and 2020 low density single family housing will increase by 201%. Multiple family housing will increase 42%.

One can clarify the imported water urban sprawl link controversy by asking a simple question. What is the intended use of the imported water? If the use of the imported water is to build more residential and industrial units in regions that were previously not urbanized, then yes, imported water supports urban consumption of land. In Tijuana, land use planners are preparing for tremendous growth along major highways to the east and the south. One planner relayed to me that he would like to see more centralized urban development in Tijuana. However, landowners along these highway corridors are lobbying for Tijuana's urban expansion (Graizbord pers. com. 1999).

According to document analysis of local newspapers and economic development publications, San Diego's local political and business leaders support the notion to use imported water from the IID-SDCWA water transfers to build more homes, and high tech/tourism based economies (See for example: Editorial "Securing Water" *San Diego Union Tribune*, August 14, 2001 at B8; City of San Diego 1999; San Diego Association of Governments 1999; San Diego Dialogue 1999; Editorial "Working for Water," *San Diego Union Tribune*, September 4, 1998). In terms of the Imperial Irrigation District (IID)-San Diego County Water Authority transfers, a staff member of the State Water Resources Control Board states that San Diego's politicians intend to build new homes with the IID water. This use of water is problematic as the staff member asks "What happens after the transfer contract expires, and IID decides to sell this water to another water user?"

The EIR analysis ignores the crucial fact -- indeed, the stated purpose for the transfer -- that the project provides a secure, reliable source of water to sustain San Diego County's projected growth, reliability which is currently non-existent. This securing of a reliable source of water to

[16] If one examines the map of MWWD service area, one can see that even this geographic representation of urbanization in the San Diego region is incomplete. MWWD does not service urban regions in the north part of San Diego County, a region that is rapidly growing in terms of urban growth and expansion, especially for cities such as Oceanside.

insure against drought situations is itself growth-inducing, even if the amount of water supplied to the region in normal years remains constant. The Draft EIR/EIS itself recognizes that it continues to be true, today and into the future: "All of the projections [for growth in the San Diego region] are based on the assumption that the necessary water supplies would continue to be available to the region in the future." (DEIR/EIS Sec. 5.2.2, p. 5-37). The growth inducement effect of available water is all the more true, given the adoption in 2001 and the January 1, 2002 effective date of State S.B. 221: Water suppliers and distributors now are directly and explicitly involved in the determination whether urban development is allowed to proceed, based on the availability of their water supply. Developments may not proceed without the water agencies' determination, making the availability of water a necessity for development as a matter of law, and giving the water agencies an active role in growth management. This Project, in increasing water supplies and/or improving its reliable flow, will make it directly possible for water suppliers to allow growth development. The Draft EIR/EIS fails to take S.B. 221 into account.

What I find baffling is that there is evidence in numerous documents and communications that these water transfers will support urban growth and expansion. Yet the EIR/EIS chooses to ignore these documents. I ask why ignore growth inducing impacts and request EIS and EIR must recognize and quantify the growth inducing impacts of their respective projects in the water-receiving communities.

Links Between Water Transfers, Urban Expansion
and Surface Water Quality in Water-receiving Communities

Urban consumption of land due to increased water imports, are critical in terms of the region's water quality, simply because water quality scientists, the United States Environmental Protection Agency and coastal water pollution non-governmental organizations (such as the American Oceans Campaign, Heal the Bay, San Diego BayKeeper) assert that urban growth and it consequent land cover change, is probably the primary cause of nonpoint source pollution deposited in Southern California's and Baja California's coastal waters.[17] A recent Los Angeles times report articulates how nonpoint source pollution travels and enters coastal waters.

> A drop of rain plunks onto a sidewalk in downtown Los Angeles. Spilling over the curb, it whirls down the drain. Five hours later, after coursing 18 miles through the heart of the city, the storm water carrying every germ and chemical it encountered along the way splashes into the ocean at Playa del Rey. Everyday rain or shine, enormous quantities of potentially toxic wastes, from human sewage to garden pesticides to metal that flakes off roofs and car brake pads are washed onto the streets and yards onto the beaches in Southern California (Cone 1999).

[17] Nonpoint source pollution does not originate from a single source, rather it is human/animal waste, chemicals, oil and other substances that have collected on the ground, are washed off by water flows and eventually enter and pollute watersheds and coastal waters. Other terms for nonpoint source pollution are polluted runoff, urban runoff and storm water pollution.

Urban expansion and increasing population growth exacerbate urban polluted runoff in two ways. First increasing populations generate more contaminants. Second, when regions urbanize, there is an increase of impervious surface area. These impervious surfaces do not allow rainwater to be absorbed by vegetation or soils, and hence storm water runoff flows in greater velocities and volumes to surface waters (American Oceans Campaign 1997; San Diego Association of Governments 1997; Dallman and Piechota 2000). Pollutants such as copper (released from car brake pads), fertilizers, oil, bacteria and viruses are picked up by runoff, and discharged untreated to surface waters via the storm water conveyance system. Furthermore impervious areas such as asphalt or concrete greatly impede the natural pollutant filtration system when rainwater is allowed to percolate into the soil, or accumulate in wetland regions.

In essence as the surface area of impervious surfaces increase, there is an increase of urban runoff flows (Bay and Schiff 1996). As urban populations grow there is a greater concentration of nonpoint source contaminants that enter urbanized region's storm drains, rivers, streams and coastal waters. Between 1972 and 1995 Southern California's urban runoff has increased approximately by 1100 percent (Cone 1999). Table 2 summarizes the major pollutants found in Southern California's polluted runoff, and the amounts deposited in coastal waters.[18]

Table 2
Southern California
Runoff Pollutants -- Historical Increases[19]

Pollutant (in metric tons)	**1972**	**1995**	**% Change**
Copper	18	88	+389
Zinc	101	316	+213
Lead	90	39	-57
Nitrate	980	8,800	+798
Phosphorous	410	2,900	+607
Total Urban Runoff (gallons)	**63.9 billion**	**771 billion**	**+1,106%**

Source: Cone 1999, citing data from the Southern California Coastal Water Research Project (SCCWRP) Annual Reports.

[18] Polluted runoff is especially problematic for bay and estuary regions, which are semi-enclosed and poorly flushed out by tides. For the San Diego-Tijuana region, urban runoff is identified as a primary source of pollution for semi-enclosed water bodies such as the San Diego Bay, Mission Bay, the Tijuana River, Sweetwater River and San Diego River estuaries.

[19] This data reflects pollutant mass estimates from urban runoff, based upon sampling of urban runoff. For a discussion of how these estimates are calculated see Schiff (1996). Schiff (1996) notes that other elements need to be considered such as pollutant transport, contaminant fate, and biological impairment.

According to the SCCWRP, estimates of mass emissions of pollutants listed in Table 2 can demonstrate significant variability due to: 1) that a small fraction of watersheds and runoff volumes are actually monitored, and 2) there exists tremendous variability in contaminant concentrations among various watersheds and storm events (Schiff 1996, 1). However, Schiff (1996, 21) points out that even when utilizing the lower end of pollutant mass emission estimates, pollutant emissions from urban runoff are substantial relative to other sources of pollutant emissions (such as those from power generating stations or even some municipal wastewater treatment plants).

Besides heavy metals, urban polluted runoff carries viral and bacterial pathogens. This public health concern is reflected in the quote from the *San Diego Union Tribune* editorial at the beginning of this section. Pathogens can afflict swimmers and surfers when polluted ocean water enters their ears, noses or mouths. Surfers exposed to pathogens risk contracting gastroenteritis, hepatitis, ear nose and throat infections, respiratory ailments, diarrhea, rashes and other illnesses (American Oceans Campaign 1997). In 1995, the Santa Monica Bay Restoration Project and the University of Southern California researchers conducted an epidemiological study to examine the health effects of swimming near storm drain outfalls in the Santa Monica Bay (American Oceans Campaign 1997, 9). The study:

> ... compar[ed] individuals swimming at the outfall location, with those swimming 400 yards away, found substantial increases in experiencing fever, chills, ear discharges, vomiting, coughing and phlegm, respiratory diseases and gastrointestinal illness among those swimming directly in front of the outfall (American Oceans Campaign 1997, 9).

The study confirmed what surfers had been claiming for decades. There is an increased risk of illness associated with swimming near storm drain outfalls (the discharge outlets for polluted runoff). This section discussed the links between imported water supplies, urban expansion and coastal water quality in Tijuana and Southern California. However, urban expansion and its consequent pollution from point and nonpoint sources, not only threaten coastal waters, but drinking water sources within the receiving region of the hydrocommons. Below is a discussion of local water supply contamination resulting from urban consumption of land. What is interesting to note is that certain local politicians and water agencies in the region assert that one remedy for contamination of local water resources, is an *increased reliance* on imported water supplies.

<u>Linking Water Imports with Local Surface/Groundwater Water Contamination</u>

Probably the greatest threat to Tijuana’s local water supply is water pollution from industrial/urban point and nonpoint sources. One indicator of the concentration of pollutants in Tijuana’s local supplies is the Tijuana River aquifer. This aquifer lies beneath the Tijuana River, a river that travels through the City of Tijuana. According to Guzman (1998) over 100 wells draw from this aquifer, producing an average of 5,000 acre-feet per year of water. After analyzing twenty well samples during wet and dry weather conditions, Guzman (1998) concludes that the aquifer is contaminated. Wells that demonstrate high levels of total dissolved solids, nitrates and fluctuating numbers of coliform are contaminated by uncontained wastewater flows. A second source of well contamination is the presence of heavy metals such as barium and silver, contaminants that originate from industrial, commercial, residential and automobile activities (Guzman 1998).

What Guzman did not address in his analysis is contamination from nonpoint sources found in Tijuana's polluted runoff flows. In 1996-97 rainy season, researchers from San Diego State University conducted an analysis of Tijuana's urban polluted runoff. From storm water samples significant amounts of zinc, copper and lead (all toxic heavy metals) were present. Other pollutants detected were cadmium, chromium and nickel (Gersberg et al. 2000, 36-39).[20] Given the study results and above discussion on Southern California's urban runoff pollution, it can be expected that as Tijuana's urbanized population and urbanized region grows, so will the amount of urban polluted runoff flows increase. Tijuana's main supply surface water reservoirs, Presa Rodriguez and Presa Carrizo are currently protected from urbanization and urban sources of contamination. However, irregular residential settlements or colonias are expanding from the west towards both these reservoirs. It is unknown as to how much the Tijuana River aquifer has been contaminated from urban polluted runoff.

Protection from urban nonpoint source pollution is not the case for San Diego's surface and groundwater supplies. Just southeast of San Diego, the Sweetwater River flows into the Sweetwater reservoir, a local supply source of fresh water for residents which reside in east San Diego, and suburbs such as National City, Chula Vista and Bonita Vista. Urbanization has started to encroach on land near the western part of the reservoir, and regions upstream the reservoir. According Dennis Bostad, the Director of Water Quality for Sweetwater Authority (the water supply agency which manages the Sweetwater Reservoir) runoff from urbanized area within the Sweetwater watershed causes a severe degradation of drinking water quality. This water quality degradation is caused by urban runoff flows during wet and dry weather conditions (Bostad pers. com. 1999). To illustrate his point Bostad referred to one indicator of drinking water quality for health and taste standards, the amount of Total Dissolved Solids (TDS), or an indication of the amount of salts present in drinking water supplies Table 3 summarizes the data Bostad (pers. com. 1999) presented to me:

Table 3
Salts Present in Drinking Water Supplies

Type of water	TDS parts per million (ppm)

[20] For chromium, copper and lead residential land uses demonstrated the highest levels of these pollutants. This is surprising, since the assumption has been that export manufacturing plants or maquiladoras are the primary source of pollutants (Gersberg et al. 2000).

Local surface waters (unaffected by urbanization)	200-250
Colorado River imported water	600-1000
Reclaimed water	1250
Urban runoff	2000-5000

As one can see from this chart according to Bostad and the Sweetwater Authority, the best water quality is from local surface water unaffected by urban pollution sources. In fact, Sweetwater blends its local water supplies with Colorado River water, to dilute the amount of TDS present in imported Colorado river water.[21]

Within the past decade urban development within the Sweetwater River watershed, posed a contamination threat to Sweetwater Authority's drinking water supply. As urban development continues to grow in the drainage areas which contribute runoff flow to the Sweetwater Reservoir, urban runoff will contribute continuous and increasing flows that are high in TDS or salts, and other contaminants such as heavy metals and viral/bacterial pathogens. Given the high concentrations of pollutants in urban runoff, the Sweetwater Authority constructed an urban runoff diversion system Sweetwater Authority, n.d.). The system completed in 1998 intercepts and directs a significant portion of urban runoff from the reservoir. Urban runoff, or high TDS water is diverted into PVC-lined holding ponds which form wetland marshes. Some of the urban runoff is allowed to percolate into an aquifer downstream, where it is treated using reverse osmosis demineralization (Sweetwater Authority n.d.). Some of the diverted high TDS runoff does not enter the aquifer and continues down the Sweetwater River, where it discharges and deposits its pollutants into the San Diego Bay. The urban runoff diversion system removes annually 535 tons of salts each year from the Sweetwater Authority water supply (Sweetwater Authority, n.d.).

However, even with the urban runoff diversion system, water quality within the Sweetwater River water, along with most rivers in the San Diego-Tijuana metropolitan region, continue to be threatened by urban development, or more specifically, land use development conducted with no consideration of downstream water quality impacts. At present many stakeholders (including the EPA and the SCCWRP) state that polluted runoff is primarily a beach or coastal water problem. However according to Bostad (pers. com. 1999), as urban development moves inland or upstream, the problem extends upstream to fresh water resources:

> Historically what has happened is most of growth has occurred on the coast. So as the concentration of growth moves east [upstream], then that all the runoff ends up in higher concentrations at the coast. As growth continues to move east, that line of impact of runoff will move east or upstream also. Right now urban growth is impacting the beaches where people are absolutely upset about the conditions of the beaches. People in the

[21] Southern California Metropolitan Water District blends its Colorado River water with State Water Project water to reduce the high amounts of TDS present in Colorado River water.

> county are not as cognizant of the impacts to the drinking water reservoirs located near the coast. But the same urban runoff problems occur at reservoirs with trash, bacterial contamination, and high TDS water runoff. Generally with all the reservoirs in our system in the county, many are attached to imported water supply, and if more and more growth is allowed upstream of these reservoirs, they could come under pressure from having impacts from urban runoff flows. Sweetwater is the only reservoir in the county right now which has an urban runoff diversion system. As they build in South County around Otay reservoir, and build in North County upstream of reservoirs there will be more pressures of urban runoff to drinking water quality in both places. It will happen more and more as growth continues.

In the San Diego metropolitan region land use planning rarely if at all takes into consideration protection of local watershed or coastal water quality. The concern of urban polluted runoff is more often than not ignored in the environmental assessment process (as required in San Diego by the California Environmental Quality Act) of urban development projects. Often the assessment will state that individually a development project can pose significant cumulative impacts in a watershed, but these impacts cannot be mitigated (City of Santee 1997). California's Regional Water Quality Control Boards and the California Coastal Commission have developed plans to address the cumulative impacts of urban point and nonpoint sources for the watershed and coastal receiving waters. However, there is immense resistance to these plans from inland communities (or communities upstream), the Building Industry Association and the County of San Diego. One planner I interviewed suggested that planning departments in this metropolitan region should map projected urban growth patterns not by each city/political jurisdiction (as it is commonly done in Tijuana and San Diego), but map urban sprawl in each watershed. Then he states, the public and land use planning decisionmakers can visualize the cumulative amounts of polluted runoff generated by urban development as it continues to expand upstream (Author interview).

In addition, the EIR/EIS analysis needs expand definition of water quality from that of simply imported water quality, and include water quality issues within local watersheds. As Bostad points out below, if urban development continues upstream, imported water reservoirs may be the next sites of contamination from urban polluted runoff. Bostad's solution to localized water quality problems encompasses an integrated vision of water resources management. Such a vision integrates imported water use, land use planning, and local watershed protection. It is a comprehensive analysis that must be conducted in the EIR/EIS process.

> Since the 1960s, we at Sweetwater have been making water quality improvements. Developing multiple barriers to water quality degradation. The treatment plant built in the 1960s is one type barrier, the other is going backwards into the watershed supply system, and that is why we have our urban runoff diversion system. Recently, we are taking more and more efforts to interact with the San Diego County planning department. We are trying to improve land use practices that may impact water quality.

> Our interaction with the County planning department has been less successful. I think there should be better communication between the County and water agencies. We need to impart a better way to express the value of source water management as an important tool for future land use planning and protection of water resources. I think part of the problem is that there is a mixed perception of local water and protection of local water resources. The City of San Diego, Helix, Sweetwater Authority, Oceanside and Vista are the only water supply agencies that have local supply reservoirs. As a result most of the people in the County perceive water quality from the perspective of imported water quality not local water quality. So I think it is real important that we get a better understanding of source water quality, and the reasons to protect local sources.
>
> The San Diego County Water Authority [the agency which imports water for San Diego County] for example has a different perspective. First they don't treat water. They don't have local reservoirs that they are protecting from urban runoff. Their perspective is one of imported water only, and that is going to change because they are developing programs for local storage. I think their perception that "We can put water in a reservoir that is not protected from urban runoff" is going to change because that water is going to require additional treatment, therefore it will cost more. Or if there is a situation where there is enough deterioration of that water that they put in a reservoir then perhaps they can't take it out and treat it one hundred percent, then they will have to blend it again. So there are other issues of loss of supply due to loss of local water quality, they will have to address in the future (Bostad pers. com. 1999)

It is at this point that my discussion of water quality impacts within the hydrocommons comes to full circle. I have discussed how imported water supplies can encourage, in part, urban growth and most definitely urban expansion. I have discussed how urban pavement of land and its by-product urban polluted runoff contaminates coastal waters and even local fresh water supplies. As Bostad implies above, part of the San Diego's local water quality problem is water importation. From a planning perspective, there is little to no consideration of the relationship between imported water, urban expansion and urban polluted runoff. This urban polluted runoff (which has resulted from imported water supporting urban expansion) degrades local water quality of not only locally captured drinking water, but ironically enough as Bostad states above, local imported water storage facilities. It is this connection which needs to be made between transbasin diversions, land use planning and water quality.

I end this section with a personal research narrative (Michel 2000) concerning water importation and local water quality degradation. In August 1999, my parents who reside in Lakeside, a suburb seventeen miles east of San Diego, asked me to attend a public hearing on contamination of an aquifer that provides drinking water to Lakeside residents. The aquifer, known as the Santee-El Monte aquifer, an unconfined groundwater basin directly beneath the San Diego River. This aquifer provides water for three water districts.[22] Riverview Water District, my parent's local water supply district, uses local groundwater supplies to reduce the high cost associated with

[22] This aquifer is known as the Santee/El Monte groundwater basin. At least eighty-three private, municipal or industrial wells are in operation in the Santee/El Monte Basin (Weinburg 2000).

imported water.[23] The public hearing I attended was called because earlier that summer, ground water samples tested for unsafe amounts of methyl tertiary butyl ether, a gasoline additive commonly referred to as MTBE. MTBE is an oxygenating agent added to gasoline for cleaner gas combustion, hence cleaner air. However, in California, cleaner air has meant contaminated drinking water. MTBE is leaking from underground storage fuel tanks, fuel pipelines and other sources, and is subsequently contaminating surface and groundwater sources. MTBE is a known carcinogen, and takes years to break down in water bodies (Lakeside Water District 1999).

Hydrological studies revealed that three gas stations (and their leaking underground storage tanks) located on or near the aquifer are the sources of well water contamination. At the August 11, 1999 hearing I listened to public health experts discuss MTBE, and why there is a cause for concern. I listened to a County of San Diego public health official who stated that the gas stations may be the cause of contamination, but that the gas stations were currently in compliance with environmental law (environmental law in terms of hazardous material storage). I listened to a hydrologist talk about the hydrology of the aquifer, and the different, yet expensive methods available to remove MTBE from groundwater supply. One resident asked the board of experts, "Why could you just not use legal action to get the gas companies to clean up the wells?" The representative from the County of San Diego said legal action to clean up the wells might be a possibility, but if you do that, then well the gas companies will pass on the costs to the Lakeside residents, and gas prices in Lakeside might increase.

At this point, a resident asked, "Why not shut down the wells and just rely on imported water?" In essence then Lakeside residents would not have to worry about local water pollution, not worry about higher gas rates, and still have safe drinking water. A heated discussion then ensued, because some residents did not want to have to pay higher costs for imported water. At present locally pumped groundwater from the Santee-El Monte groundwater basin is produced for the approximate cost of $65 dollars per acre-foot. Riverview Water District pays $550 dollars per acre-foot to buy imported water from San Diego County Water Authority (Phone interview with Riverview Water District, May 30, 2000). Approximately one month after the hearing, Riverview Water District shut down four wells due to MTBE contamination. The wells provided thirty-two percent of the District's water supply, and these water supplies will be replaced by expensive water imports provided by the San Diego County Water Authority (Lakeside Water District 1999).[24]

[23] In certain regions of the basin, groundwater quality reflects significant levels of nitrates and TDS, hence my parent's local water supply agency, Riverview Water District, blends the groundwater with imported water to improve drinking water quality (Riverview Water District Public Hearing, August 11, 1999).
[24] According to the Riverview Water District, it is working with local and state agencies to obtain funding for an MTBE treatment facility. In addition the District has applied for financial reimbursement from

One would think that local politicians would take steps to prevent further contamination of the aquifer, but this is not the case. In August 2000, the County of San Diego approved a Riverway Specific plan for Lakeside's section of the San Diego River. In this plan and most of the land on or adjacent to the San Diego River is zoned for heavy industrial use. The land zoned for industrial use lies within recharge areas of the Santee-El Monte groundwater basin, and lies within the zone of influence for active wells.[25] Representatives from local water agencies, Lakeside community residents and coastal clean water activists strongly objected to this zoning proposal. However, from my observations of public hearings and interviews of public officials, the County of San Diego elected leaders seem to be more preoccupied with tax generation from industrial economic activity in the San Diego River, than protecting local sources of water supply and coastal waters downstream. It seems that Lakeside's San Diego River and the Santee-El Monte aquifer water quality might become another casualty to urban development with no consideration to water quality impacts.[26]

In his book *Cadillac Desert*, Marc Reisner (1993) uses the Los Angeles urban growth machine case study, to explain the vicious cycle that occurs between water importation and urban growth. Essentially his argument is that if a city imports water and then grows (in urban population numbers and urban land expansion), this urban growth causes a demand for more water. Subsequently, there is yet another demand for more imported water, which results in more urban growth and so forth. My research adds another component to this "vicious cycle" --- the degradation of water quality in the receiving region of the hydrocommons. This particular component is ignored in the EIR/EIS analysis and must be addressed, especially since local source water protection is being ignored in favor of increasing imported water supplies to the region. From my standpoint, if a city imports water, then the city grows and expands, which then

California's State Department of Health Services for the cost differential between well and imported water (Riverview Water District 2000, 4).

[25] Since the Santee-El Monte aquifer is an unconfined groundwater basin, there is interaction between surface water (in the San Diego River) and groundwater.

[26] Information for this case study stems from my participation observation of land use planning hearings and document analysis associated with the Upper San Diego River Improvement Project or USDRIP between May and August 2000. Until recently, the USDRIP process has been primarily concerned with increasing industrial development in the Lakeside's portion of the San Diego River. Water quality impacts to the San Diego River and the Santee-El Monte Groundwater Basin were largely ignored in the environmental assessment process. In fact the County determined from its cursory water resources analysis, environmental effects from this project are not found to be significant to local water resources (County of San Diego Department of Planning and Land Use, 2000). The County staff reasoned in its environmental assessment, that if business owners in the region follow the law, then there will be no contamination of water resources. Lakeside residents countered that current users in the area do follow the law, and the groundwater is still contaminated. In addition, Lakeside residents, the local Chamber of Commerce, and even the Lakeside School District have requested that the County scrap the USDRIP plan

causes a demand for more water, which then results in more imported water and consequent urban growth/expansion. The city grows and eventually the first signs of cumulative water quality problems appear. Beaches start closing and surfers are getting sick from increasing levels of urban polluted runoff and raw sewage discharges. As urban pavement of land moves upstream, local water resources become contaminated by urban development and polluted runoff. This contamination of local water supplies forces local water agencies to either curtail urban growth near local water resources, or import water which then allows urban expansion without consideration of local water quality to continue. The Sweetwater Authority has tried with little to no success the former strategy, integration of water importation, urban planning and local water resources management. Lakeside may opt for the later -- water importation. When will this vicious cycle end in Southern California? More importantly, from my interviews with local politicians and water agency directors in Tijuana, it seems that Baja California's political and business leaders plan to follow Southern California's model of water importation, and consequent economic development and urban expansion (Michel 2000).

My argument is not that urban growth or development is essentially bad or wrong, but at some point the EIR/EIS analysis must ask and answer the difficult questions concerning what are the local land use development implications, and more importantly the localized water quality impacts of imported water? Water quality activists, the U.S. EPA, and even local water pollution government officials all have told me that the best solution is to integrate in terms of governance: water resources, land use planning, transportation planning and endangered species protection (Michel 2000). In 1999, the County of San Diego's Smart Growth Coalition water resources working group started a discussion on the links between water supply, land use planning and water quality. However, representatives from this task force have are not optimistic. Most believe that local city politicians, land use planners, land development corporations and water import agencies in both San Diego and Tijuana will ignore this document, and hence continue to ignore the links between water importation, urban expansion and water quality (Michel 2000). The SDCWA/IID water transfer EIR/EIS analysis has done a wonderful job obfuscating the links between water importation and urban growth/expansion inducement. Hence, local water quality impacts, more importantly local source water quality has been completely ignored.

Environmental Justice Analysis Missing and Required

The geography of water resources along the border between California and Baja California, demonstrates a network of manmade aqueduct and storage facilities utilized for water transfers. This hydrocommons transports Colorado River for agricultural uses in the eastern part of the

and create a river park. The County ignored these requests, and at present a coalition of Lakeside residents are considering legal challenges to heavy industry uses, especially near wellheads.

Californias border region, and ultimately west to urban centers on the Pacific Coast. As with other urban regions in Baja California and Southern California, the Tijuana-San Diego metropolitan region is dependent upon water imports for the region's rapidly growing industrial and residential needs. Both San Diego and Tijuana seek to increase Colorado River water imports, and both cities are investigating the possibility of constructing a binational aqueduct to transport imported Colorado River water. Environmental consequences of increased infrastructure such as the binational aqueduct need to be addressed in the EIR/EIS process.

However, transbasin diversions not only adversely impact sending regions such as the ColoradoRiver Delta, but receiving regions. These that I detailed above are environmental justice problems in urban San Diego, and are completely ignored in the EIR/EIS process. In Tijuana-San Diego metropolitan region, a region that imports up to ninety percent of its water supply, water imports do contribute to urban consumption of land. This urban expansion results in more contaminants, and second an increase of paved surfaces. As with any urbanized region, polluted runoff flows pick up chemicals and germs and discharges concentrated amounts of bacterial and chemical pollutants into rivers and coastal waters. In both Tijuana and San Diego, polluted runoff is the primary public health risk for surfers and swimmers in the region's surface waters. Finally, for rapidly urbanizing regions, nonpoint source pollution is threatening local water drinking water quality resources. Certain water agencies such as Sweetwater Authority ask for integration of water resources and land use planning. Other communities such as Lakeside, chose to shut down local drinking water resources, and import even more water. Given consideration of energy costs associated with long distance water imports, water importation may not provide a cost-effective, reliable and secure drinking water supply. Contamination of local source water supplies and increased costs associated with water imports pose to low-income and minority communities throughout San Diego significant water quality and water supply cost problems (Michel 2000). Environmental justice problems and analysis must be addressed in the EIR/EIS process associated with the IID-SDCWA transfers.

In Los Angeles environmental justice activists and watershed movements are just now starting to understand the connections between imported water, urban expansion and local water quality degradation. These movements such as the Los Angeles & San Gabriel Rivers Watershed Council and California's Clean Water Action assert that Southern California's water pollution problem is not one limited to coastal contamination and beach closures. The problem is associated with land use planning without consideration to local water quality, a lack of ethic of care for watersheds in Southern California and imported water. Southern California's urban watershed movements are coordinating with watershed organizations in Northern California to limit or even reduce water imports from the Sacramento-San Joaquin Rivers Delta, as demonstrated by the below statement from a letter written by urban watershed and environmental justice groups to California's Governor Gray Davis:

> Water management decisions (especially those made without a connection to land use) can promote sprawl and can result in increased infrastructure costs to urban residents as well as increased concentrations of non-point source pollution in urban streams and waterways. ...Our communities already suffer from deteriorating infrastructure and polluting industries (Environmental Water Caucus 1999).

As indicated above, certain watershed groups are concerned with not only environmental impacts in the sending region, but the problem of urban expansion, urban polluted runoff and subsequent degraded surface and ground water quality of urban watersheds which receive water imports.

Finally a significant environmental justice issue inadequately addressed in the EIR/EIS is the lack of attention to alternatives of enhancing water supplies besides water transfers, such as demand management and water reclamation. This is especially significant for low-income communities since the price of water produced via demand management is $130 per acre-foot, versus the cost of water transfers at over $400 per acre-foot (City of San Diego 1999). If one observes the large numbers of green lawns in the region, one can observe there plenty of opportunities to increase water efficiency via demand management just for outdoor residential/commercial use of water. On the average San Diegans utilize 100 gallons per day of water for outdoor landscapes (Vickers 2001). This amount is over three times the amount of water Tijuana residents use on a daily basis for indoor and outdoor use. What is being done in the city/county planning departments to retain storm water on-site and thus reduce water use? Finally, when compared to Los Angeles DWP's low-flow toilet program (just last year the 1,000,000 million toilets dispersed), the San Diego County and City low-flow toilet program pales in comparison, especially in terms of outreach to low-income and minority communities.

Below I have listed questions that the EIR/EIS must recognize and analyze to rectify the significant gap in environmental justice issues. From the analysis proper mitigation measures must be identified and implemented.

- Will the IID-SDCWA water transfers indirectly or directly induce urban expansion that will generate urban runoff or other contaminants (MTBE for example) and consequently impair source water quality and groundwater storage facilities?
- Will each community and water district to receive these transfers be provided an opportunity to be informed of the full costs of transferred water, and how these costs compare to locally produced water supply costs, and water produced via demand management (Environmental justice principle concerning "Public Right to Know")?

- Will community and water district receiving these transfers be informed that the water transfer is not a permanent transfer or right to the community, but instead leased water subject to the demands of a water market (Environmental justice principle concerning "Public Right to Know")?
- Will the water transfers directly or indirectly induce urban expansion that will result in habitat loss, fragmentation or perforation for endangered and threatened species listed by the United States and the State of California?
- Will the water transfers directly or indirectly induce urban expansion that will generate urban runoff, and consequently result in the impairment of a water body under Section 303(d) of the Clean Water Act?
- Will any transfer of water result in the increase of importation of salts to a local community or watershed, especially one such as the San Diego River watershed that is already listed as impaired for TDS? In fact, Colorado River water (the saltiest of Southern California's imported water supplies) carries an estimated 9 million tons of salt annually to Southern California's local surface and groundwater sources.[27]
- Will demand management and reclaimed water be given priority to produce more water, versus the increased reliance upon water transfers?
- Besides the binational aqueduct, what other infrastructure will be built to accomodate the water transfers, especially infrastructure at the water district and municipality scale? If new infrastructure is being built to accomodate the water transfers, is this not evidence that the water transfers are growth inducing? For example the City of San Diego Water Department is currently asking for a 6% percent rate increase over the next five years. This money should raise approximately 500 million dollars for capital improvements, and a local city council member estimates that 43% of the rate hike will accomodate further urban expansion? Why does the EIR/EIS ignore the full range of infrastructure projects that will transport the water transfers and possibly induce growth?
- What measures/inducements are provided by government agencies, private business and non-governmental organizations in the SDCWA service region to conserve and/or use reclaimed water? How does San Diego compare with demand management efforts conducted by Los Angeles Department for Water and Power?
- Is San Diego County Water Authority pursuing any efforts to increasing water supplies via water recycling and groundwater replenishment, similiar to the Orange County Ground Water Replenishment System? If so what is the status, and how much water will be produced?

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[27] Newcom, Josh. Getting Serious about Salt: Urban Water Purveyors Seek Solution to Mounting Problem. *Western Water*. Sacramento CA. Water Education Foundation. (September/October 1999).

- Has the California Urban Water Conservation Council conducted a water audit of any water service agencies in the service area of the San Diego County Water Authority and if so, what are the results?
- How many City/County general plans in the San Diego County Water Authority Service Area contain a water conservation element, or a zoning element requiring water conservation and reclamation? How effective have these plans or zoning requirements been?

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